

induced in a non-energized phase, and
a second input supplied with a reference voltage for comparison;
a commutation shift element for changing the reference voltage in accordance with a specific curve; and
a manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a setpoint speed of the direct-current motor, wherein the manipulated-variable calculation element computes the manipulated variable as a non-linear function of the setpoint speed of the direct-current motor, and the manipulated variable is fed, on the one hand, as an input to the commutation shift element, and, on the other hand, to the commutation logic to adapt a current supply to stator winding phases of the direct-current motor.

REMARKS

Claims 10-21 are now pending.

Applicants respectfully request reconsideration of the present application in view of this response.

With respect to paragraph (1) of the Office Action, the drawings were objected to for including the term "n_soll" as not appearing in the Specification. In the Specification, this term was translated to " N_{setpoint} ." Figure 1 has therefore been corrected to replace the term n_soll with N_{setpoint} . The corrected Figure 1 accompanies this response. It is therefore respectfully requested that this objection be withdrawn.

With respect to paragraph (3) of the Office Action, claims 10, 11, 15 and 16 were rejected under 35 U.S.C. § 103(a) as unpatentable over United States Patent No. 5,640,073 ("Ikeda") in view of United States Patent No. 6,078,158 ("Hereen").

Claim 10 relates to a method for shifting an instant of commutation for a sensorless and brushless direct-current motor including stator windings fed by a multi-phase converter connection. Claim 10 as now presented provides for "changing the reference voltage in dependence upon at least one of a *predefined* setpoint value of a rotational speed of the direct-current motor and a manipulated variable calculated from the *predefined* setpoint value." (Emphasis added.)

Claim 16 relates to a system for shifting an instant of commutation. Claim 16 as now presented provides for a "manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a *predefined* setpoint

speed of the direct-current motor.” (Emphasis added.)

Although the rejections may not be agreed with, to facilitate matters, claims 10 and 16 now indicate that the setpoint value is a *predefined* setpoint value. Support for this may be found in the Specification, for example, at page 5, lines 7-11. Furthermore, as provided in the Specification, one advantage of the claimed subject matter is that, using the method or system of the claimed subject matter, “there is no power notch observed, as in the case of a commutation shift dependent on the *measured* rotor speed.” Specification at p. 2, lines 9-10 (Emphasis added).

The Office Action asserts that Ikeda discloses “changing the reference voltage in response to a desired rotational speed,” and asserts that the text at col. 7, lines 63-67 and col. 8, lines 1-12 supports this assertion. However, Ikeda actually refers to a “microcomputer” that “detects a rotational speed of the rotor”, and that transmits a basic reference voltage according to this measured rotational speed of the rotor. Col. 7, lines 63-67 and col. 8, lines 1-12. Therefore, Ikeda refers to detecting a *measured* rotational speed and transmitting a reference voltage based on this *measured* rotational speed, and it therefore does not describe or even suggest the feature of “changing the reference voltage in dependence upon at least one of a predefined setpoint value of a rotational speed of the direct-current motor and a manipulated variable calculated from the predefined setpoint value,” as in claim 10. Furthermore, Ikeda does not describe or even suggest the feature of a “manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a predefined setpoint speed of the direct-current motor,” as in claim 16.

As for the secondary Hereen reference, the Office Action asserts that “Ikeda et al fail to describe that the induced voltage would be taken from an unenergized winding,” and relies on Hereen as purportedly describing this feature. The Hereen reference is not relied upon as disclosing the feature of “changing the reference voltage in dependence upon at least one of a predefined setpoint value of a rotational speed of the direct-current motor and a manipulated variable calculated from the predefined setpoint value,” as in claim 10. Furthermore, Hereen does not describe or even suggest the feature of a “manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a predefined setpoint speed of the direct-current motor,” as in claim 16.

To reject a claim as obvious under 35 U.S.C. § 103, the prior art must disclose or suggest each claim element and it must also provide a motivation or suggestion for combining the elements in the manner contemplated by the claim. (See Northern Telecom, Inc. v. Datapoint

Corp., 908 F.2d 931, 934 (Fed. Cir. 1990), cert. denied, 111 S. Ct. 296 (1990); In re Bond, 910 F.2d 831, 834 (Fed. Cir. 1990)).

Even if Ikeda is combined with Hereen (the appropriateness of which is not conceded), that combination does not disclose (or even suggest) the claim features discussed above of claims 10 and 16. For example, neither of these references discloses or suggests the feature of "changing the reference voltage in dependence upon at least one of a predefined setpoint value of a rotational speed of the direct-current motor and a manipulated variable calculated from the predefined setpoint value," as in claim 10 as presented, or the feature of a "manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a predefined setpoint speed of the direct-current motor," as in claim 16 as presented. Therefore, it is respectfully submitted that each of claims 10 and 16 as now presented is not obvious over the references relied upon, so that each of claims 10 and 16 is allowable, as are claim 11 and 15, which depend from claim 10.

As further regards all of the above obviousness rejections, to reject a claim as obvious under 35 U.S.C. § 103, the prior art must disclose or suggest each claim element and it must also provide a motivation or suggestion for combining the elements in the manner contemplated by the claim. (See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990), cert. denied, 111 S. Ct. 296 (1990); In re Bond, 910 F.2d 831, 834 (Fed. Cir. 1990)). Thus, the "problem confronted by the inventor must be considered in determining whether it would have been obvious to combine the references in order to solve the problem", Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679 (Fed. Cir. 1998). It is believed and respectfully submitted that the references relied upon simply do not address the problems (referred to in the present application) that are met by the subject matter of any of the rejected claims.

The cases of In re Fine, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988), and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), also make plain that the Office Action's assertions that it would have been obvious to modify the reference relied upon does not properly support a § 103 rejection. It is respectfully suggested that those cases make plain that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect the proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

Instead, the Examiner relies on hindsight in reaching his

obviousness determination. . . . **One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.**

In re Fine, 5 U.S.P.Q.2d at 1600 (citations omitted; emphasis added). Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .

Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].

In re Jones, 21 U.S.P.Q.2d at 1943 & 1944 (citations omitted; italics in original).

That is exactly the case here since it is believed and respectfully submitted that the Office Action reflects hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding.

More recently, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not even the case here, there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed", stating that:

In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. *With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed.* In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper *prima facie* case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

(See In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Federal Circuit 2000) (*italics added*)). Here again, it is believed that there have been no such findings to establish that the features discussed above of the rejected claims are met by the reference relied upon. As referred to above, any review of the reference relied upon makes plain that it simply does not describe the features discussed above of the claims as now presented.

In summary, it is respectfully submitted that claims 10 to 11 and 15 to 16 are allowable at least for the foregoing reasons.

With respect to paragraph (4) of the Office Action, claims 12-14 and 17-21 were objected to as depending from a rejected base claim, but the Examiner indicated that these claims would be allowable if rewritten in independent form. In this regard, claims 12, 17 and 21 have been rewritten in independent form, including all of the features of the base claim and any intervening claims. Claims 13 and 14 depend from claim 12, and claims 18 to 20 depend from claim 17, so that these claims depend from allowable claims. It is therefore respectfully submitted that claims 12-14 and 17-21 are allowable, and it is therefore requested that the objections be withdrawn.

In summary it is respectfully submitted that all of claims 10 to 21 are allowable for the foregoing reasons.

CONCLUSION

In view of all of the above, it is believed that the objections to and rejections of the claims have been obviated, and that currently pending claims 10 to 21 are allowable. It is therefore respectfully requested that the objections and rejections be reconsidered and withdrawn, and that the present application issue as early as possible.

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Respectfully submitted,
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AMENDMENT VERSION WITH MARKINGS

IN THE CLAIMS:

Without prejudice, please amend the claims as follows:

10. (Amended) A method for shifting an instant of commutation for a sensorless and brushless direct-current motor including stator windings fed by a multi-phase converter connection, comprising the steps of:

detecting the instant of commutation by comparing a voltage induced in a stator winding phase in which no current is applied to a reference voltage; and

changing the reference voltage in dependence upon at least one of a predefined setpoint value of a rotational speed of the direct-current motor and a manipulated variable calculated from the predefined setpoint value.

12. (Amended) [The method according to claim 10, further comprising the step of:] A method for shifting an instant of commutation for a sensorless and brushless direct-current motor including stator windings fed by a multi-phase converter connection, comprising the steps of:

detecting the instant of commutation by comparing a voltage induced in a stator winding phase in which no current is applied to a reference voltage;

changing the reference voltage in dependence upon at least one of a setpoint value of a rotational speed of the direct-current motor and a manipulated variable calculated from the setpoint value; and

shifting the instant of commutation such that the reference voltage is raised in a shape of a parabola.

16. (Amended) A system for shifting an instant of commutation, comprising:
a multi-stage converter connection, including:

an output stage control,

a commutation logic,

a phase selector, and

a phase discriminator;

a sensorless and brushless direct-current motor fed by the multi-stage converter

AMENDMENT VERSION WITH MARKINGS

connection;

a commutation detection element, including:

a first input supplied by the phase selector with an instantaneous value of a voltage induced in a non-energized phase, and

a second input supplied with a reference voltage for comparison;

a commutation shift element for changing the reference voltage in accordance with a specific curve; and

a manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a predefined setpoint speed of the direct-current motor.

17. (Amended) [The system according to claim 16,] A system for shifting an instant of commutation, comprising:

a multi-stage converter connection, including:

an output stage control,

a commutation logic,

a phase selector, and

a phase discriminator;

a sensorless and brushless direct-current motor fed by the multi-stage converter connection;

a commutation detection element, including:

a first input supplied by the phase selector with an instantaneous value of a voltage induced in a non-energized phase, and

a second input supplied with a reference voltage for comparison;

a commutation shift element for changing the reference voltage in accordance with a specific curve, wherein in the commutation shift element, the reference voltage is changed in accordance with a parabola; and

a manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a setpoint speed of the direct-current motor.

AMENDMENT VERSION WITH MARKINGS

21. (Amended) [The system according to claim 16,] A system for shifting an instant of commutation, comprising:

a multi-stage converter connection, including:

an output stage control,

a commutation logic,

a phase selector, and

a phase discriminator;

a sensorless and brushless direct-current motor fed by the multi-stage converter connection;

a commutation detection element, including:

a first input supplied by the phase selector with an instantaneous value of a voltage induced in a non-energized phase, and

a second input supplied with a reference voltage for comparison;

a commutation shift element for changing the reference voltage in accordance with a specific curve; and

a manipulated-variable calculation element for supplying a manipulated variable to the commutation shift element as a function of a setpoint speed of the direct-current motor, wherein the manipulated-variable calculation element computes the manipulated variable as a non-linear function of the setpoint speed of the direct-current motor, and the manipulated variable is fed, on the one hand, as an input to the commutation shift element, and, on the other hand, to the commutation logic to adapt a current supply to stator winding phases of the direct-current motor.



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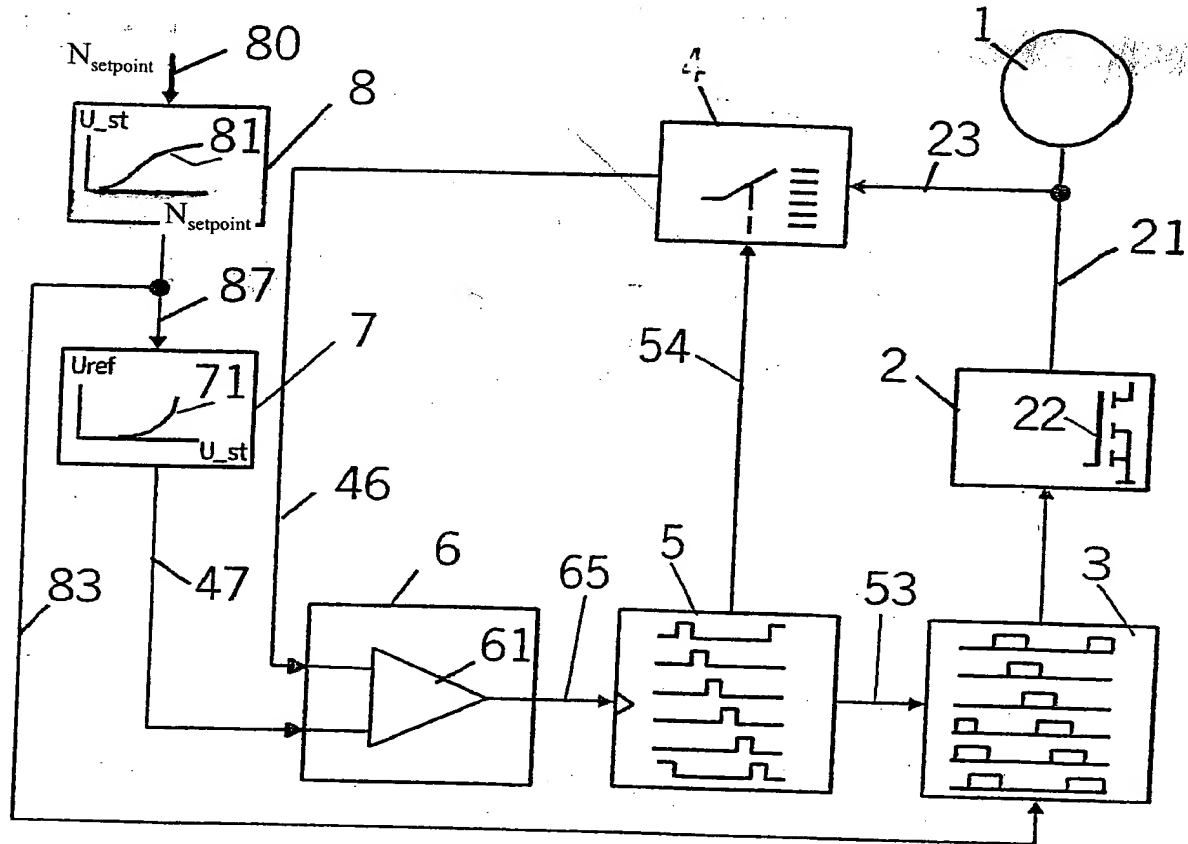


FIG. 1

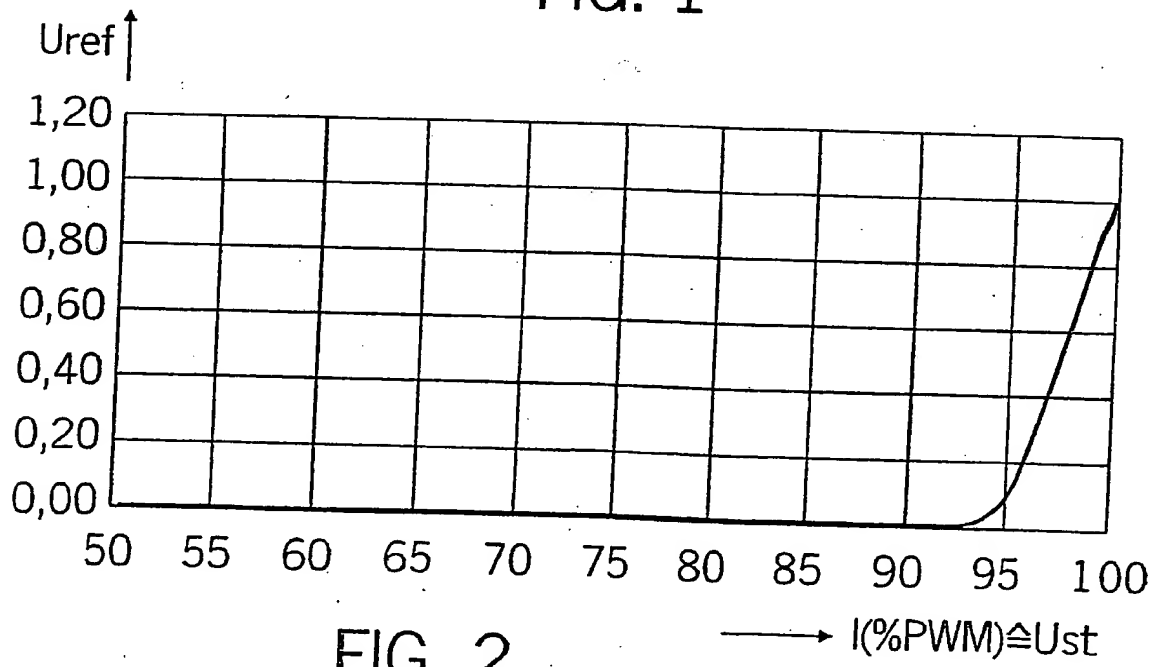


FIG. 2